

The Influence of Instrumentality Beliefs on Intrinsic Motivation:

A Study of High-Achieving Adolescents

David J. Kover

San Francisco Unified School District

Frank C. Worrell

University of California, Berkeley



A number of recent studies have shown that students who believe that school is instrumental to gaining access to valued future outcomes, such as a desired career or admission to a prestigious college, are more motivated to achieve than students who lack these beliefs (Lens & Decruyenaere, 1991; Malka & Covington, 2005; Mickelson, 1990). An important question that arises from these studies, however, is whether the motivation that students derive from these instrumentality beliefs is actually adaptive. Because instrumentality beliefs concern outcomes that are extraneous to the act of learning itself, many motivation theorists would predict that they encourage extrinsic valuing of learning, and dampen the inherent interest and enjoyment that we would hope students find in their academic pursuits (Eccles, Wigfield, & Schiefele, 1998; Ryan, Sheldon, Kasser, & Deci, 1996). This is certainly the perception of instrumentality beliefs that is reported in the media.

summary

For many students, school is a forward-looking endeavor, with implications for future educational opportunity, job prospects, and financial success. How does believing that school is linked to a desired future outcome—known as an instrumentality belief— influence motivation? A number of studies have indicated that rewards, or other concerns that are external to the task at hand, can diminish the intrinsic motivation to engage in that task, a fact that would call into question the adaptive nature of these instrumentality beliefs. In a recent study, Miller, DeBacker, and Greene (1999) indicated that instrumentality beliefs about school not only increase extrinsic motivation, but also increase intrinsic motivation. Miller et al. examined college students; the current study replicated their study in a population of high-achieving high school students. In the current study, the positive influence of instrumentality beliefs on intrinsic motivation was not found. Given these findings, we discuss the ways in which the future goals of high-achieving high school students may differ from those of students in a college population and offer directions for further research in this area that might elucidate these differences. Research of this sort may ultimately have important implications for how educators frame for students the relationship between schooling and their future goals.

The New York Times, for instance, recently ran a story on the trend for elite high schools to cut Advanced Placement (AP) courses from their curriculum and explained one high school's decision saying,

Scarsdale [High School] is concluding that the A.P. pile-on is helping turn the teenage years into a rat race where learning becomes a calculated means to an end rather than a chance for in-depth investigation, imagination, even some fun to go along with all that amassing of knowledge. (Berger, 2006, p. B7)

Authors of popular works like *The Overachievers* (Robbins, 2006) and *The Price of Privilege* (Levine, 2006) draw similar conclusions about the detrimental effects of instrumentality beliefs, describing the joyless and ultimately self-injurious behavior of high-achieving adolescents who demonstrate few personal interests, and only value school for its role in the college admissions process.

Despite the assumption in both the popular and research literatures that instrumentality beliefs are antithetical to a sincere interest in school, fine-grained analyses of the circumstances that produce intrinsic motivation have offered a more complicated picture (Covington & Mueller, 2001; Husman & Lens, 1999; Simons, DeWitte, & Lens, 2000). In the current study, we examined whether instrumentality beliefs promote extrinsic valuing of learning experiences while decreasing intrinsic enjoyment. This study replicates an earlier study that showed that, indeed, instrumentality beliefs positively predicted both extrinsic *and* intrinsic motivation (Miller, DeBacker, & Greene, 1999). Miller et al.'s (1999) sample consisted of college students; however, the participants in the current study are high-achieving adolescents. Both the age and achievement history of the individuals studied are important issues for this type of research because life stage determines the types of goals that are linked to instrumentality beliefs, and attitude toward achievement is a key factor in determining the effects of goals on intrinsic motivation (Harackiewicz & Sansone, 2000; Husman & Lens, 1999; Simons et al., 2000).

Intrinsic Motivation

Self-Determination Theory

The primary theoretical explanation of intrinsic motivation, self-determination theory (SDT; Deci & Ryan, 1985), defines intrinsic motivation as engagement in a task for reasons inherent to the task itself, such as interest or enjoyment, rather than for external reasons, such as monetary rewards (Deci & Ryan, 1985; Eccles et al., 1998; Ryan & Deci, 2000a, 2000b). It is easy to see, then, why instrumentality beliefs—defined as the belief that success on a present task will provide access to some future outcome—are theorized to discourage intrinsic valuing of a task (Ryan et al., 1996). Instrumentality beliefs, by definition, imply that the individual has external reasons for engaging in the task at hand.

Although predictions about the strength of intrinsic motivation are commonly boiled down to the presence of externally motivating factors, such as the aforementioned monetary rewards, SDT offers more complex reasoning than this simple intrinsic-extrinsic dichotomy (e.g., Deci & Ryan, 1985; Ryan & Deci, 2000a, 2000b). It is an elucidation of SDT that begins to explain why it is possible that instrumentality beliefs are not inherently contrary to interest and enjoyment of activities in the present.

Competence and Autonomy

Central to the explanation of intrinsic motivation within SDT (Deci & Ryan, 1985; Ryan & Deci, 2000a, 2000b) is that individuals desire to feel both competent and autonomous. Earlier work had associated the development of intrinsic motivation with individuals' desire to feel efficacious and to expand their capabilities (White, 1959). Deci and Ryan (1985) accepted this notion, labeling it competence, but argued that the desire for competence was mediated by individuals' sense of personal control in their pursuits, as had been previously explained by DeCharms (1968). In other words, individuals are most intrinsically motivated when they feel that they exercised some personal choice in pursuing the valued

actions. For instance, several of the early studies in this area demonstrated that intrinsic motivation decreased when a reward was offered for participation in a task (e.g., Deci, 1971; Lepper, Greene, & Nisbett, 1973). SDT argued that this reward-for-participation task structure created a sense of external control that negatively influenced participants' sense of autonomy, thereby decreasing their intrinsic motivation. By contrast, in studies where rewards were received without prior warning, participants were unlikely to feel that they had been forced into anything, and, moreover, they were also likely to feel that their competence with the task had been affirmed, actually increasing subsequent intrinsic motivation (e.g., Lepper et al., 1973).

SDT theorists (Deci & Ryan, 1985; Ryan & Deci, 2000a) used the notions of competence and autonomy to outline some basic tenets for predicting the influence of external factors on intrinsic motivation. First, they predicted that external events that are *controlling* in nature cause individuals to attribute some outside factor as the cause for their behavior, destroying their sense of autonomy and with it their intrinsic motivation. Second, they argued that *informational* feedback, or information that supports individuals' sense of competence, is supportive of intrinsic motivation. Finally, they label *amotivating* feedback as that which creates a perception of incompetence for individuals, and thus decreases intrinsic motivation.

Must Instrumentality Antagonize Interest?

Organismic Integration Theory

SDT theorists (Deci & Ryan, 1985; Ryan & Deci, 2000a) hold that intrinsic motivation is the most adaptive form of task engagement; however, they also recognized that, especially after early childhood, task engagement is driven by extrinsic motivators in many situations. They argued that rather than persisting in pursuits that held no inherent value for them, individuals internalized this extrinsic motivation to varying degrees

depending on the circumstances. SDT has incorporated these notions about the circumstances under which external factors can actually enhance intrinsic motivation into a subtheory called organismic integration theory (OIT). Thus, an individual could perform an act for a reason distinct from the act itself and still value that task intrinsically in certain situations. As elucidated above, SDT theorists saw the experience of autonomy and competence as primary factors in determining the degree to which extrinsic motivation became internalized.

The SDT theorists also added a third primary need, that of connectedness to important other individuals in their lives. For example, they pointed to the tendency of children with close relationships to their parents or teachers to be more intrinsically motivated by school tasks. The full continuum of internalization will not be discussed here, but it is important to note that when an extrinsically motivated task is undertaken in a context that is supportive of autonomy, competence, and connectedness, it will be more completely internalized than if these circumstances did not exist. It is within this framework that the possibility that instrumentality goals may support intrinsic motivation will be discussed.

Performance-Contingent Reward Structures

As compared to the classical intrinsic motivation experiment (Deci, 1971), the rewards offered by instrumentality beliefs function quite differently, and this difference has important implications for intrinsic motivation outcomes. The traditional reward scenario involved what are known as task-contingent rewards—*a reward was offered in return for either engagement with, or completion of, a task.* As noted previously, and as confirmed by several meta-analyses on the vast body of intrinsic motivation research (Deci, Koestner, & Ryan, 1999; Rummel & Feinberg, 1988; Ryan & Deci, 2000b; Tang & Hall, 1995; see Eisenberger & Cameron, 1996, for alternative results), these types of rewards have negative effects on intrinsic motivation. Indeed, they are clear instances of an external control. It is unlikely, however, that instrumentality beliefs about school are that simple. It is hard to

imagine a reward for school that requires individuals simply to show up. Rather, the outcomes to which school is instrumental require individuals to meet certain standards of performance. This type of reward structure in which individuals know that they must perform at a certain level in order to receive the reward is known as *performance-contingent* reward.

As with task-contingent rewards, although the presence of the reward in the performance-contingent task structure can be experienced as controlling, and hence antagonistic to intrinsic motivation, there are multiple other effects to take into account when considering performance-contingent rewards (Harackiewicz & Sansone, 2000; Ryan & Deci, 2000b). The interpretation will depend on which of these is salient to the participant in a given performance-contingent reward situation to be able to best predict intrinsic motivation. Because performance-contingent rewards hold individuals to a certain standard of achievement, they include the experience of evaluation and also contain potential competence-feedback—both are factors that influence intrinsic motivation.

Evaluation and Intrinsic Motivation

The effects of impending evaluation within a performance-contingent reward structure hinge largely on the importance individuals place on the evaluation that is to come, the stress they associate with the impending evaluation, and their expectations about the nature of the evaluation to come (Harackiewicz, Abrahams, & Wageman, 1987; Harackiewicz & Manderlink, 1984). When the evaluative process either takes on such importance to the individual that the evaluation itself functions as a controlling reward, or makes the task a stressful experience (e.g., the promise of social comparison for a poor student), this will be antagonistic to intrinsic motivation (Harackiewicz et al., 1987). In keeping with the predictions made by SDT (Deci & Ryan, 1985) about competency feedback, expectations of an evaluation that is task-focused and informational, on the other hand, will increase intrinsic motivation (Harackiewicz & Sansone, 2000).

Competency Feedback

Moreover, as predicted by SDT, the competency feedback that comes with the evaluation will influence subsequent motivation depending on whether it is positive or negative, with negative feedback proving amotivational and positive feedback affirming competence and promoting intrinsic motivation (Deci & Ryan, 1985). These differences are especially important to consider with regard to beliefs about the future instrumentality of school, because students receive multiple opportunities for feedback (grades) along the path to whatever instrumentality goals they may have. Thus, there are multiple opportunities where their intrinsic motivation with regard to the distal goal may be supported or damped.

In short, there are competing influences on intrinsic motivation that result from the performance-contingent reward structure that instrumentality beliefs most closely mirror. It is notable, however, that unlike task-contingent reward structures, some studies at least seem to indicate that, on balance, performance-contingent reward structures would appear to enhance intrinsic motivation (Harackiewicz & Manderlink, 1984).

Goals and Intrinsic Motivation

A further area of research that is relevant to the relationship between intrinsic motivation and instrumentality beliefs is work that has been concerned with goal theory. Although SDT (Deci & Ryan, 1985; Ryan & Deci, 2000a) provides explanations for how extrinsic motivators such as future goals can become internalized to support intrinsic motivation, recent goal theory deals explicitly with the effects of distal future goals on intrinsic motivation in the present (Harackiewicz & Sansone, 2000; Husman & Lens, 1999).

Personally Valued Long-Term Goals

Building upon work like SDT that has shown that extrinsic rewards are not inherently opposed to intrinsic motivation, but

rather than it depends on the degree to which they are considered to be externally controlling, both Husman and Lens (1999) and Simons and her colleagues (2000) have created theoretical models that demonstrate this for individuals' long-term goals. That is, whether or not the rewards (goals) are temporally delayed, the chief concern remains whether they are experienced as controlling or not. Thus, when instrumentality goals are personally valued, they will be supportive of intrinsic motivation.

As with the continuum of internalization presented within OIT (Ryan & Deci, 2000a), these theorists offered a model for the circumstances under which long-term goals will promote intrinsic valuing of tasks in the present. They argued for three types of long-term goals: those that are both autonomously chosen and intrinsically valued, goals that are autonomously chosen but not intrinsically valued, and finally, goals that are neither autonomously chosen nor personally valued (Husman & Lens, 1999; Simons et al., 2000). The autonomously chosen, personally valued goals, which they labeled *endogenous instrumentality* and *internal-intrinsic goals*, respectively, represent the most intrinsically motivating goals, while the latter two categories represent moves away from intrinsic valuing of a goal.

The Present Study

Despite earlier claims that instrumentality beliefs cannot produce intrinsically motivated behavior (Ryan et al., 1996), work in the area of performance-contingent rewards and long-term goals has made clear that although some instrumentality beliefs may bring about negative effects on intrinsic motivation, there are other instances in which instrumentality beliefs might actually prove supportive of intrinsic motivation (Harackiewicz et al., 1987; Harackiewicz & Manderlink, 1984; Husman & Lens, 1999; Ryan & Deci, 2000a; Simons et al., 2000). Miller et al. (1999) demonstrated exactly what the research would seem to imply—instrumentality beliefs can actually exert a positive influence on intrinsic motivation. Miller et al. examined the rela-

tionship between instrumentality beliefs and both intrinsic and extrinsic motivation in a population of undergraduate students in a teacher education program who were taking a required course in educational psychology.

Miller et al. (1999) used multiple regression to measure the influence of instrumentality on intrinsic and extrinsic motivation, and, in each case, they controlled for both mastery and performance goals. The rationale for this latter step was to ensure that the influence of the instrumentality beliefs was not absorbed by more proximal goals. Traditionally, a mastery goal orientation has been associated with intrinsic motivation, whereas a performance goal orientation has been associated with extrinsic motivation (Dweck & Leggett, 1988). As would be expected, instrumentality was a strong predictor of extrinsic motivation in the present, explaining 32.5% of the variance ($\beta = .57, p < .001$), even after controlling for learning and performance goals. More surprising, however, was that even after controlling for mastery and performance goals, instrumentality explained 9% of the variance in intrinsic motivation ($\beta = .30, p < .001$). Mastery goals explained 18% of the variance in intrinsic motivation, and performance goals made no contribution to intrinsic motivation. Interestingly, performance goals also had little effect on extrinsic motivation. In short, Miller and colleagues found that instrumentality was strongly linked to extrinsic motivation, and it also demonstrated a statistically significant and sizeable relationship with intrinsic motivation.

The present study is a replication of the Miller et al. (1999) study. It employs the same design, uses the same measures, and employs the same statistical analyses. In this sense, the present study is a pure replication. The present study, however, drew from a sample of high-achieving adolescents, as opposed to the undergraduate students who participated in the Miller et al. study. This is an important distinction for a number of reasons. As Miller and colleagues acknowledged, because their sample was in a career-oriented training program, the temporal distance between their future goals and their current academic pursuits was relatively short. Given that the end was in sight, so to speak, for these students, their instrumentality beliefs might have generated a

particularly strong pull on their motivation, which might have influenced the findings. Moreover, because the participants in the initial study were currently taking a course with content linked to their career paths, as long as that career path was personally valued, their goal choice would not provide a threat to their sense of autonomy and so, as predicted by both SDT and goal theory, would not substantially decrease their intrinsic motivation (Deci & Ryan, 1985; Husman & Lens, 1999; Simons et al., 2000).

Recognizing that the Miller et al. (1999) sample was gathered from a population that would tend toward intrinsic motivation-supportive instrumentality beliefs, the goal of the present study was to test their findings in a population with goals that were less clear-cut—high-achieving adolescents. First of all, although this may not be the case for all of them, unless their goals terminate with admission into college, adolescents will be relatively more distant from their goals than will the career-tracked undergraduates in the Miller et al. sample. Second, it is expected that, as a group, adolescents may possess less distinct goals for themselves than the participants in the Miller et al. study, who had already chosen a career.

Finally, it is expected that adolescents will possess certain instrumentality goals that are distinct from those of college students. The most notable of these is likely the college admissions process. Indeed, the college application process is harshly evaluative, and is often marked by external regulation on the part of adolescents' parents. It would not be surprising if these factors resulted in a negative influence on intrinsic motivation in the current sample (Harackiewicz et al., 1987; Harackiewicz & Manderlink, 1984; Husman & Lens, 1999; Simons et al., 2000). Likewise, because the current study drew from a particularly high-achieving population, it was likely that participants would demonstrate a particularly positive orientation toward achievement (Dai, Moon, & Feldhusen, 1998), another factor that is expected to influence levels of intrinsic motivation (Harackiewicz & Manderlink, 1984).

Taking these factors into account, the present study had two goals in replicating the Miller et al. study (1999). The first was to

explore whether instrumentality beliefs would prove supportive of extrinsic motivation in the present, even when controlling for both mastery and performance goals. Instrumentality beliefs and extrinsic motivation are commonly thought to be related (e.g., Ryan et al., 1996), and it was hypothesized that the present study would replicate the Miller et al. findings of a strong, positive relationship between instrumentality and extrinsic motivation. The second goal was to explore whether instrumentality beliefs will prove supportive of intrinsic motivation in the present, even when controlling for mastery and performance goals, as the Miller et al. study demonstrated. As noted previously, because the Miller et al. study employed participants whose situation may have been conducive to intrinsic motivation-supportive instrumentality beliefs, it was hypothesized that the current study would not replicate the Miller et al. finding of the strong positive relationship between instrumentality and intrinsic motivation.

Method

Participants

Participants were 961 students (44% male) attending a summer program for academically talented adolescents at a major research university in California. Participants' ages ranged from 11 to 18 ($M = 14.35$, $SD = 1.41$). The sample included a wide range of ethnic groups, the largest of which were Chinese American (43.6%), White (14.4%), mixed ethnicity (8.8%), and Chicano (5.8%). Other groups that were represented in smaller numbers included African American, Korean American, Japanese American, and East Indian/Pakistani American. The large number of Asian American students—8% of the sample—parallels the student populations at elite public and private universities in California.

The summer program that the participants were attending admits students based on a combination of grades, standardized test results, work samples, and teacher recommendation. The par-

ticipants' mean self-reported GPA in their home schools was 3.83 ($SD = .37$), and previous research on students in this program has indicated that the profile of the participants is more similar to students identified for gifted and talented education programs than students with high IQs who have not been identified (see Worrell & Schaefer, 2004). Participants were taking a wide variety of courses, including writing and language arts, lab sciences, math, and the arts. Several of the courses were AP courses, and these, as well as a number of the other courses, could be taken for credit at the students' home schools.

Measures and Procedure

Participants completed a series of measures as part of a course evaluation packet during the fifth week of the 6-week program. The packet included a demographic questionnaire, an evaluation of teacher effectiveness, and a rating of course satisfaction. For the current study, participants completed the same 20 items that had been used in the Miller et al. study (1999; see the Appendix for a list of the items).

The 20 items used in the current study were originally part of a larger 51-item measure called the "Approaches to Learning Survey" (for full review, see Miller et al., 1999). The items used in this study represent five specific subscales from this larger measure: mastery goals (3 items); performance goals (2 items measuring approach and 4 measuring avoidance); perceived instrumentality (5 items); extrinsic motivation (3 items); and intrinsic motivation (3 items). All items consist of statements about participants' reasons for engagement in learning (e.g., I do the work assigned in this class because I don't want others to think I'm not smart.). The items measure students' motivation specific to the course they were taking at the time of the administration of the measure. All employ a 5-point Likert-type rating scale (1 = *strongly disagree*, 5 = *strongly agree*). Miller et al. (1999) reported that an oblique factor analysis demonstrated that the predicted factor structure held up, although they only reported one set of item loadings and did not specify whether these came from the structure or pattern

matrix. One item on the mastery goals subscale cross-loaded, but they kept this item in the measure in order to preserve reliability. They reported adequate reliability estimates for scores on each of the subscales, ranging from .84 and .91.

Results

Preliminary Analyses

Structural validity. In order to test the structural validity of the scores, a confirmatory factor analysis (CFA) was conducted to see how well the 20 items fit the five-factor structure used by Miller et al. (1999). Several criteria were used to assess goodness of fit. We examined the chi-square to degrees of freedom ratio; the non-normed fit index (NNFI), which takes model complexity into account; the comparative fit index (CFI), which takes sample size into account; the standardized root mean square residual (SRMR), a summary of the average covariance residuals; and the root mean square error of approximation (RMSEA), as well as a 90% confidence interval around RMSEA values. We also examined the Satorra-Bentler scaled chi-square (Satorra & Bentler, 1994), which corrects for nonnormality in the data and produces robust standard errors. Acceptable fit indices include a chi-square to degrees of freedom ratio between 1 and 2 (Hair, Anderson, Tatham, & Black, 1995), NNFI and CFI values in the .95 range (Hu & Bentler, 1998), SRMR values less than .08, and RMSEA values less than .05 (Byrne, 2001, 2006; MacCallum, Browne, & Sugawara, 1996). Maximum-likelihood extraction procedures were used to analyze the covariance matrices based on raw scores using EQS, Version 6.1 (Bentler, 2005). To scale the latent variables, a single indicator for each of the factors was set at unity.

The CFA results are presented in Tables 1 and 2. As can be seen in Table 1, four of the five fit indices were in (NNFI, CFI, SRMR) or near (RMSEA) the acceptable range, indicating a good fit. Only the χ^2/df ratio was not in the acceptable range with a value greater than 2. The robust statistics yielded similar results,

with increases in fit for both the χ^2/df ratio and the RMSEA. The standardized coefficients for the item scores on their respective factors are presented in Table 2. All coefficients were .70 or higher. Additionally, reliability estimates were moderate to high range for scores on all subscales (see Table 3). These results provided support for using the constructs as specified.

Descriptive statistics. Means, standard deviations, and reliability estimates for scores on each of the subscales are presented in Table 3 for the total sample. As some research suggests that individuals of Asian American descent demonstrate intrinsic motivation under different circumstances than do European American individuals (Iyengar & Lepper, 1999), and 58% of the current sample was Asian American, we examined interactions between group membership (Asian/non-Asian) and instrumentality, performance, and mastery goals in subsequent regression analyses predicting intrinsic and extrinsic motivation. In keeping with best practice, in Table 3, we also report reliability estimates and other descriptive statistics separately for the Asian and non-Asian students.

Findings were generally similar across groups. Instrumentality was moderately correlated with intrinsic motivation and strongly correlated with extrinsic motivation. Instrumentality also had a moderate association with mastery goals. Mastery goals had moderate to high correlations with both intrinsic and extrinsic motivation. Performance goals did not have a meaningful relationship with any other construct, and intrinsic and extrinsic motivation were also moderately correlated. These results were largely consistent with the findings reported by Miller and colleagues (1999). Asian and non-Asian students did not differ significantly on any of the major variables (critical alpha = .01), although the difference on intrinsic motivation approached significance ($p < .05$); however, this difference was quite small (Cohen's $d = .17$).

Regression Analyses

Because preliminary analyses indicated that instrumentality was linked to both extrinsic and intrinsic motivation, it was

Table 1
Fit Indices From Confirmatory Factor Analyses (Maximum Likelihood)

Model	χ^2	df	χ^2/df	NNFI	CFI	SRMR	RMSEA	(90% C. I.)
Null Model	13524.39	190						
Robust model (Satorra-Bentler)	789.94*	160	4.94	.944	.953	.037	.064	.060-.068
	569.68*	160	3.56	.951	.959	—	.052	.047-.056

Note. N = 961; NNFI = non-normed fit index; CFI = comparative fit index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; C. I. = confidence interval.

* $p < .001$.

Table 2

*Standardized Coefficients for Items From
Confirmatory Factor Analysis*

Factors	Standardized coefficients
Factor 1: Mastery Goals	
Item 1	.72
Item 5	.78
Item 10	.84
Factor 2: Performance Goals	
Item 7 (Approach)	.83
Item 18 (Approach)	.70
Item 2 (Avoidance)	.80
Item 12 (Avoidance)	.86
Item 14 (Avoidance)	.82
Item 16 (Avoidance)	.85
Factor 3: Instrumentality Goals	
Item 3	.73
Item 8	.80
Item 13	.81
Item 15	.89
Item 17	.87
Factor 4: Intrinsic Motivation	
Item 4	.84
Item 9	.84
Item 20	.82
Factor 5: Extrinsic Motivation	
Item 6	.79
Item 11	.82
Item 19	.82

Table 3*Descriptive Statistics for Major Variables*

	1	2	3	4	5	M	SD	α
Total Sample ($N = 961$)								
1. Instrumentality	—					3.90	.83	.91
2. Performance goals	.07	—				2.55	.98	.92
3. Mastery goals	.54*	.01	—			4.10	.72	.82
4. Extrinsic motivation	.78*	.03	.57*	—		4.04	.77	.85
5. Intrinsic motivation	.44*	.00	.68*	.48*	—	3.79	.88	.87
Asian Americans ($n = 561$)								
1. Instrumentality	—					3.94	.77	.92
2. Performance goals	.11	—				2.56	.98	.92
3. Mastery goals	.52*	.09	—			4.07	.71	.82
4. Extrinsic motivation	.73*	.05	.55*	—		4.05	.72	.84
5. Intrinsic motivation	.40*	.04	.66*	.46*	—	3.74	.81	.86
Other Americans ($n = 372$)								
1. Instrumentality	—					3.85	.92	.90
2. Performance goals	.01	—				2.50	.98	.91
3. Mastery goals	.58*	-.09	—			4.15	.72	.82
4. Extrinsic motivation	.83*	-.00	.61*	—		4.03	.84	.86
5. Intrinsic motivation	.48*	-.05	.69*	.52*	—	3.89	.93	.88

* $p < .005$.

deemed appropriate to further explore these relationships. This was done using multiple regression analyses.

Predicting extrinsic motivation. The first regression analysis was to establish the connection between instrumentality and extrinsic motivation. The analysis included mastery and performance goals as predictor variables to show that any influence of instrumentality beliefs on extrinsic motivation was not confounded by more proximal goals. However, this already seemed unlikely, given the low correlation between performance goals and intrinsic motivation during the preliminary analysis. We also examined the interaction between race (Asian/non-Asian) and mastery, performance, and instrumentality goals. Thus, mastery and performance goals were entered in the first block of the equa-

Table 4*Instrumentality as a Predictor of Extrinsic Motivation*

Variable	B	β	t	p	Adj. R^2	ΔR^2
Step 1						
Constant	1.48		11.23	.001		
Mastery goals	.62	.57	21.31	.001		
Performance goals	.02	.02	0.69	.491		
					.33	.33
Step 2						
Constant	.74		.741	.001		
Mastery goals	.23	.21	8.99	.001		
Performance goals	-.02	-.02	-1.09	.276		
Instrumentality goals	.62	.67	28.46	.001		
					.64	.31
Step 3						
Constant	.75		7.49	.001		
Mastery goals	.19	.17	5.27	.001		
Performance goals	-.01	-.01	-0.37	.713		
Instrumentality goals	.66	.71	20.39	.001		
Race x Mastery	.06	.17	1.48	.140		
Race x Performance	-.01	-.03	-0.47	.640		
Race x Instrumentality	-.07	-.17	-1.50	.134		
					.64	.00

tion, instrumentality was entered in the second block, and the race-goal interactions were entered in Block 3.

The first block accounted for 33% of the variance in extrinsic motivation, driven by mastery goals—the contribution of performance goals was not statistically significant or meaningful. Results also indicated that instrumentality, entered in the second block, was a strong predictor of extrinsic motivation, explaining 31% of the variance even after controlling for mastery and performance goals (see Table 4). The race-goal interactions entered in Block 3 were not significant and contributed no additional vari-

Table 5*Instrumentality as a Predictor of Intrinsic Motivation*

Variable	B	β	t	p	Adj. R^2	ΔR^2
Step 1						
Constant	.50		3.74	.001		
Mastery Goals	.81	.67	27.45	.001		
Performance Goals	-.01	-.01	-0.44	.658		
					.44	.44
Step 2						
Constant	.38		2.74	.006		
Mastery Goals	.75	.62	21.30	.001		
Performance Goals	-.02	-.02	-0.69	.491		
Instrumentality Goals	.10	.10	3.43	.001		
					.45	.01
Step 3						
Constant	.38		2.74	.001		
Mastery Goals	.75	.62	15.32	.001		
Performance Goals	-.02	-.02	-0.49	.626		
Instrumentality Goals	.11	.11	2.51	.012		
Race x Mastery	-.03	-.07	-0.47	.636		
Race x Performance	.01	.01	0.16	.873		
Race x Instrumentality	-.00	-.01	-0.07	.941		
					.45	.00

ance to the regression equation. Altogether, the model accounted for 64% of the variance in extrinsic motivation.

Predicting intrinsic motivation. We performed a second regression analysis (see Table 5) to explore the relationship between instrumentality and intrinsic motivation. Again, mastery and performance goals were entered into the first block of the equation to ensure that any relationship discovered was not confounded by the presence of more proximal goals. Instrumentality was entered in Block 2 and race-goal interactions were entered in Block 3. In this equation, instrumentality, although statistically significant, added only 1% to the variance explained after control-

ling for the more proximal goals (see Table 5), and the race-goal interactions contributed no variance to the equation. Performance goals were not significant predictors of intrinsic motivation.

Discussion

The current study attempted to replicate previous work by Miller and colleagues (1999) that showed that instrumentality beliefs predict not only extrinsic motivation, but also intrinsic motivation. This was done using regression analyses that controlled for more proximal goals, and thus made certain that these were not confounding any possible link between the more future-oriented instrumentality beliefs and either extrinsic or intrinsic motivation in the present. The single difference between the Miller and colleagues study and the present one was that the earlier study employed a population of college students, whereas the participants in the current study were high-achieving middle and high school students.

The first of the Miller et al. (1999) findings, that instrumentality predicts extrinsic motivation above and beyond the effects of more proximal goals, was replicated. The second finding, however, that instrumentality beliefs predict intrinsic motivation above and beyond the influence of more proximal goals, was not replicated. Given the sizeable percentage of Asian American students in this sample, we also looked for interactions on the basis of group membership, but no interactions were found.

Instrumentality as a Predictor of Extrinsic Motivation

The replication of the positive relationship between instrumentality and extrinsic motivation was not surprising, not only given the robustness of Miller and colleagues' (1999) finding, but also because this relationship has considerable empirical support in the motivation literature (e.g., Eccles et al., 1998). This finding is consistent with the assumption that instrumental rewards often represent an external control to task engagement, which

shifts motivation from intrinsic to extrinsic (Ryan & Deci, 2000b; Ryan et al., 1996). Moreover, although this finding was expected, it does establish that instrumentality beliefs were linked to task motivation in the present in the current study.

Instrumentality as a Predictor of Intrinsic Motivation

The more surprising finding reported by Miller and colleagues (1999) had been the positive link between instrumentality beliefs and intrinsic motivation, even after controlling for more proximal goals, and this finding was not replicated in the current study. There are several possible interpretations for these discrepant findings. The first possibility is that, indeed, there is no link between instrumentality beliefs and intrinsic motivation. This seems unlikely, though, given both the prior findings by Miller and her colleagues, and also a series of studies since that have indicated that certain types of instrumentality beliefs do indeed produce positive increases in intrinsic motivation (Husman, Derryberry, Crowson, & Lomax, 2004; Simons et al., 2000). It seems more likely that the discrepant results can be explained by the change in study populations— the Miller and colleagues' study employed a sample of undergraduates in a teacher training program who were currently taking a course in educational psychology, whereas the present study used a population of high-achieving adolescents.

It is probable that some of the factors that form the link between instrumentality beliefs and intrinsic motivation were altered by the change in sample. Most notably, because the participants in the Miller et al. (1999) study were engaging in learning tasks that were proximally and conceptually quite close to a specific future goal—a career as a teacher—they might have manifested a stronger influence of instrumentality beliefs upon their motivation in the present. Moreover, the conceptual match between their teacher-training class and what was very possibly a personally valued future career provides a perfect example of the type of autonomously chosen goal that both OIT and goal theorists predict should enhance intrinsic motivation (Deci &

Ryan, 1985; Husman & Lens, 1999; Ryan & Deci, 2000a; Simons et al., 2000). In other words, Miller and colleagues might have chosen the ideal circumstances in which we would expect to find a strong, positive relationship between instrumentality beliefs and intrinsic motivation. By choosing a population with a more varied relationship between its future goals and its activities in the present, it is possible that the influence of instrumentality on intrinsic motivation was lessened.

It is also possible that the different sample introduced a number of contradictory influences on the relationship between instrumentality and intrinsic motivation. Indeed, both the achievement orientation of the current sample, as well as the specific variety of instrumentality goals that they espoused, were likely quite different from the participants in the Miller et al. study (1999). These factors may have influenced which aspects of the performance-contingent reward structure that characterizes instrumentality beliefs were most salient to the participants (Harackiewicz et al., 1987; Harackiewicz & Manderlink, 1984; Harackiewicz & Sansone, 2000), and it is certainly possible that these influences produced contradictory influences that resulted in little net gain one way or the other in the effect on intrinsic motivation. That is, depending upon the specific nature of the instrumentality beliefs for each of the adolescents in this study, there may have been a variety of influences on their feelings of competence, autonomy, and connectedness that OIT hypothesizes will predict intrinsic motivation (Deci & Ryan, 1985; Ryan & Deci, 2000a). After all, this study relied on a global measure of instrumentality beliefs, but included no more fine-grained analysis of the types of instrumentality beliefs, or the mediating factors between these beliefs and intrinsic motivation.

The indication, then, is that further research in this area needs to include careful analysis of the types of instrumentality goals that are espoused by individuals, the degree to which they personally value these goals, and their achievement orientation. Only then will we be able to discern the specific influences of instrumentality beliefs on intrinsic motivation. Indeed, since the study by Miller and colleagues (1999), several researchers

have attempted to better capture the various facets of instrumentality beliefs. A study by Husman and colleagues (2004) was able to establish endogenous instrumentality as an independent construct that has a positive influence on intrinsic motivation. Simons and colleagues (2000), likewise, were able to show that future consequences of a task that was personally valued could be autonomy-supportive even if those consequences were extrinsic to the task. This type of approach needs to be taken with all future research in this area, and it should be applied to a variety of populations. Given the results of the present study, more work with adolescents, and possibly younger children, should be pursued, as should work with high-achieving populations, something that has not previously been done. High-achieving populations may be expected to carry with them unique instrumentality goals and a unique orientation toward achievement situations that may influence the outcomes of this type of research.

Limitations

This study had several limitations centering primarily on the nature of the sample. Although one can argue that an academically talented sample of students is a useful one to compare with students already in college, there are limitations to the generalizability of the results given the specific nature of the sample. This study should be replicated with college students who are not yet on a specific career trajectory and with adolescents in regular education classrooms. The concern about the specific nature of the sample also has implications for the findings with regard to Asian Americans. It is possible that students who are highly identified with achievement, whatever their racial/ethnic backgrounds, do not differ on motivational constructs related to achievement in the ways that less highly academically identified students do. Finally, future research should look at these differences across different racial/ethnic groups and subgroups, as combining Asian Americans and non-Asian Americans into global groups may mask actual differences across the subgroups that are combined.

Conclusion

Limitations notwithstanding, the findings of this study are clear. In this study, we failed to replicate the Miller and colleagues (1999) finding that instrumentality beliefs exert a positive influence on intrinsic motivation. Indeed, the present results indicate virtually no influence at all. It is probable that the failure to replicate the earlier findings is due to differences in the participant samples between studies, especially in regards to proximity to future goals, specific types of future goals, and orientation towards achievement. Thus, the findings of this study and the Miller et al. study indicate that the relationship between instrumentality beliefs and intrinsic and extrinsic motivation are more complex than initially conceived, and can be affected by other factors such as those mentioned previously (i.e., achievement orientation, proximity of future goals, type of instrumentality goals). Future studies examining the relationship between instrumentality beliefs and intrinsic motivation need to take these factors into account.

References

- Bentler, P. M. (2005). *EQS 6 structural equations program manual*. Encino, CA: Multivariate Software.
- Berger, J. (2006, October 13). Demoting advanced placement. *The New York Times*, p. B7.
- Byrne, B. M. (2001). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. Mahwah, NJ: Lawrence Erlbaum.
- Byrne, B. M. (2006). *Structural equation modeling with EQS: Basic concepts, applications, and programming* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum.
- Covington, M. V., & Mueller, K. J. (2001). Intrinsic versus extrinsic motivation: An approach/avoidance reformulation. *Educational Psychology Review*, 13, 157–176.

- Dai, D. Y., Moon, S. M., & Feldhusen, J. F. (1998). Achievement motivation and gifted students: A social cognitive perspective. *Educational Psychologist, 33*, 45–63.
- DeCharms, R. (1968). *Personal causation: The internal affective determinants of behavior*. New York, NY: Academic Press.
- Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology, 18*, 105–115.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*, 627–668.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum Press.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*, 256–273.
- Eccles, J., Wigfield, A., & Schiefele, U. (1998). Motivation to succeed. In N. Eisenberg (Ed.), *Handbook of child psychology: Social, emotional, and personality development* (5th ed., Vol. 3., pp. 1017–1095). Hoboken, NJ: John Wiley & Sons.
- Eisenberger, R., & Cameron, J. (1996). Detrimental effects of reward: Reality or myth? *Journal of the American Psychological Association, 51*, 1153–1166.
- Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate data analysis with readings* (4th ed.). Englewood Cliffs, NJ: Prentice Hall.
- Harackiewicz, J. M., Abrahams, S., & Wageman, R. (1987). Performance evaluation and intrinsic motivation: The effects of evaluative focus, rewards, and achievement orientation. *Journal of Personality and Social Psychology, 53*, 1015–1023.
- Harackiewicz, J. M., & Manderlink, G. (1984). A process analysis of the effects of performance-contingent rewards on intrinsic motivation. *Journal of Experimental Social Psychology, 20*, 531–551.
- Harackiewicz, J. M., & Sansone, C. (2000). Rewarding competence: The importance of goals in the study of intrinsic motivation. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp. 79–103). New York, NY: Academic Press.
- Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*, 424–53.
- Husman, J., Derryberry, W. P., Crowson, H. M., & Lomax, R. (2004). Instrumentality, task value, and intrinsic motivation: Making sense

- of their independent interdependence. *Contemporary Educational Psychology*, 29, 63–66.
- Husman, J., & Lens, W. (1999). The role of the future in student motivation. *Educational Psychologist*, 34, 113–125.
- Iyengar, S. S., & Lepper, M. R. (1999). Rethinking the value of choice: A cultural perspective on intrinsic motivation. *Journal of Personality and Social Psychology*, 76, 349–366.
- Lepper, M. R., Greene, D., & Nisbett, R. E. (1973). Undermining children's intrinsic interest with extrinsic reward: A test of the "overjustification" hypothesis. *Journal of Personality and Social Psychology*, 28, 129–137.
- Levine, M. (2006). *The price of privilege: How parental pressure and material advantage are creating a generation of disconnected and unhappy kids*. New York, NY: Harper Collins.
- Lens, W., & Decruyenaere, M. (1991). Motivation and de-motivation in secondary education: Student characteristics. *Learning and Instruction*, 1, 145–159.
- MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, 1, 130–149.
- Malka, A., & Covington, M. V. (2005). Perceiving school performance as instrumental to future goal attainment: Effects on graded performance. *Contemporary Educational Psychology*, 30, 60–70.
- Mickelson, R. A. (1990). The attitude-achievement paradox among Black adolescents. *Sociology of Education*, 63, 44–51.
- Miller, R. B., DeBacker, T. K., & Greene, B. A. (1999). Perceived instrumentality and academics: The link to task valuing. *Journal of Instructional Psychology*, 26, 250–260.
- Robbins, A. (2006). *The overachievers: The secret lives of driven kids*. New York, NY: Hyperion.
- Rummel, A., & Feinberg, R. (1988). Cognitive evaluation theory: A meta-analytic review of the literature. *Social Behavior and Personality*, 16, 147–164.
- Ryan, R. M., & Deci, E. L. (2000a). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68–88.
- Ryan, R. M., & Deci, E. L. (2000b). When rewards compete with nature: The undermining of intrinsic motivation and self-regulation. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp. 13–54). New York, NY: Academic Press.

- Ryan, R. M., Sheldon, K. M., Kasser, T., & Deci, E. L. (1996). All goals are not created equal: An organismic perspective on the nature of goals and their regulation. In P. M. Gollwitzer & J. A. Bragh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 7–6). New York, NY: Guilford Press.
- Satorra, A., & Bentler, P. M. (1994). Corrections to test statistics and standard errors on covariance structure analysis. In A. von Eye & C. C. Clogg (Eds.), *Latent variables analysis* (pp. 399–19) . Thousand Oaks, CA: Sage.
- Simons, J., DeWitte, S., & Lens, W. (2000). Wanting to have vs. wanting to be: The effect of perceived instrumentality on goal orientation. *British Journal of Psychology*, 91, 335–51.
- Tang, S., & Hall, V. C. (1995). The overjustification effect: A meta-analysis. *Applied Cognitive Psychology*, 9, 365–04.
- White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, 66, 297–33.
- Worrell, F. C., & Schaefer, B. A. (2004). Reliability and validity of Learning Behaviors Scale (LBS) scores with academically talented students: A comparative perspective. *Gifted Child Quarterly*, 48, 287–08.

Appendix (Items from Miller et al., 1999)

1. I do the work assigned in this class because I like to understand the material I study.
2. I do the work assigned in this class because I don't want others to think I'm not smart.
3. I do the work assigned in this class because my achievement plays a role in reaching my future goals.
4. Learning the material for this class is enjoyable.
5. I do the work assigned in this class because I want to improve my understanding of the material.
6. Mastering the concepts and principles taught in this class is of value because they will help me in the future.
7. I do the work assigned in this class because I want to look smart to my friends.

8. I do the work assigned in this class because my achievement is important for attaining my dreams.
9. The concepts and principles taught in this class are interesting.
10. I do the work assigned in this class because I want to learn new things.
11. Learning this material is important because of its future value.
12. I do the work assigned in this class because I don't want to look foolish or stupid to my friends, family, or teachers.
13. I do the work assigned in this class because understanding the content is important for becoming the person I want to be.
14. I do the work assigned in this class because I don't want to be the only one who cannot do the work well.
15. I do the work assigned in this class because learning this material is important for attaining my dreams.
16. I do the work assigned in this class because I don't want to be embarrassed about not being able to do the work.
17. I do the work assigned in this class because learning the content plays a role in reaching my future goals.
18. I do the work assigned in this class because I can show people I am smart.
19. Being able to use the ideas reflected in the assignments and projects in this course will be of value to me in the future.
20. I find learning this subject matter personally satisfying.